

AMENDMENTS TO THE CLAIMS

Please **CANCEL** claims 1-7 without prejudice or disclaimer to the subject matter therein.

Please **AMEND** claims 8-35 as shown below.

Please **ADD** new claims 36-41

The following is a complete list of all claims in this application.

What is claimed is:

1. (Cancelled)
2. (Cancelled)
3. (Cancelled)
4. (Cancelled)
5. (Cancelled)
6. (Cancelled)
7. (Cancelled)
8. (Amended) A method for producing an abrasive carbon foam, comprising:
 - A) comminuting coal ~~exhibiting a free swell index of between about 3.5 and about 5.0 to a small particle size~~ to form a particulate coal;
 - B) blending said particulate coal with from about 1 to about 10% by volume of a carbide precursor to form a reactive blend for improving abrasive properties of the abrasive carbon foam; and
 - C) heating said reactive blend in a mold under a non-oxidizing atmosphere to a first temperature ranging from ~~of between~~ about 300° C to and

about 600° C, wherein the pressure is controlled to a range from about 50 psi to about 500 psi; and

soaking at this temperature for a period ranging from ~~of from~~ about 10 minutes to about 12 hours to form a ~~green foam blend~~ an abrasive carbon foam;

~~D) — carbonizing said green foam blend to form a carbonized foam by heating to a temperature of between about 600°C and about 1600°C in an inert atmosphere and holding at said temperature for a period of from about 1 to about 3 hours to form a carbonized foam; and~~

~~E) — graphitizing said carbonized foam by heating said carbonized foam to a temperature of between about 1700°C and about 3000°C in an inert atmosphere and holding at said temperature for a period of less than about one hour to form said abrasive carbon foam.~~

9. (Amended) The method for producing an abrasive carbon foam of claim 8, further comprising:

carbonizing said abrasive carbon foam by heating to a second temperature ranging from about 600°C to about 1600°C in an inert atmosphere and holding at said second temperature for a period ranging from ~~of from~~ about 1 to about 3 hours; and

graphitizing said carbonized foam by heating said abrasive carbon foam to a third temperature ranging from about 1700°C to about 3000°C

in an inert atmosphere and holding at said third temperature for a period of less than about one hour to form;

wherein said carbide precursor comprises a member selected from the group consisting of materials capable of reacting with carbon to form carbides under carbon calcining and graphitizing conditions.

10. (Amended) The method for producing an abrasive carbon foam of claim 9, wherein said carbide precursor is selected from the ~~group~~ group consisting of: tungsten, silicon and titanium.
11. (Amended) The method for producing an abrasive carbon foam of claim 9, wherein said carbon precursor ~~is a powder is of a~~ having particle size sizes below about 100 microns.
12. (Amended) The method for producing an abrasive carbon foam of claim 8, wherein said particulate coal exhibits a free swell index ranging from ~~of between~~ about ~~3.75~~ 3.5 and to about ~~4.5~~ 5.0.
13. (Amended) ~~An~~ A method of forming an abrasive carbon foam ~~manufactured by a process,~~ comprising:
 - A) comminuting coal ~~exhibiting a free swell index of between about 3.5 and about 5.0 to a small particle size~~ to form a particulate coal;

B) blending said particulate coal with from about 1 to about 10% by volume of a carbide precursor to form a reactive blend;

C) heating said reactive blend in a mold under a non-oxidizing atmosphere to a first temperature ranging from ~~of between~~ about 300° C to and about 600° C, wherein the first heating step includes controlling the pressure ranging from about 50 psi to about 500 psi and soaking at this temperature for a period ranging from ~~of from~~ about 10 minutes to about 12 hours to form a green foam blend;

D) carbonizing said green foam blend to form a carbonized foam by heating to a second temperature ranging from ~~of between~~ about 600°C to and about 1600°C in an inert atmosphere and holding at said second temperature for a period ranging from ~~of from~~ about 1 to about 3 hours to form a carbonized foam; and

E) graphitizing said carbonized foam by heating said carbonized foam to a third temperature ranging from ~~of between~~ about 1700°C to and about 3000°C in an inert atmosphere and holding at said third temperature for a period of less than about one hour to form said abrasive carbon foam.

14. (Amended) The method of forming an abrasive carbon foam of claim 13, wherein said particulate coal exhibits a free swell index ranging from ~~of between~~ about ~~3.75~~ 3.5 and to about 5.0 ~~4.5~~.

15. (Amended) The method of forming an abrasive carbon foam of claim 13, wherein said carbide precursor comprises a member selected from the group consisting of

materials capable of reacting with carbon to form carbides under carbon calcining and graphitizing conditions.

16. (Amended) The method of forming an abrasive carbon foam of claim 14, wherein said carbide precursor is selected from the ~~eroup~~ group consisting of: tungsten, silicon and titanium.
17. (Amended) The method of forming an abrasive carbon foam of claim 13, wherein said carbide precursor ~~is powder is of a~~ having particle size sizes below about 100 microns.
18. (Amended) The method of forming an abrasive carbon foam of claim 13, wherein the abrasive carbon foam has a semi-crystalline, largely isotropic, porous coal-based ~~product~~ structure having a density ranging from ~~of between~~ about 0.2 ~~and to~~ about 0.5 g/cm³.
19. (Amended) The method of forming an abrasive carbon foam of claim ~~13~~ 18, wherein the density which is a semi-crystalline, largely isotropic, porous coal-based product having a density of between ranges from about 0.3 ~~and to~~ about 0.4g/cm³.
20. (Amended) The method of forming an abrasive carbon foam of claim 1, wherein said coal particulate is a high volatile bituminous coal containing a volatile matter ranging from ~~between~~ about 35% ~~and to about~~ 45% by weight ~~of volatile matter~~.

21. (Amended) The method of forming an abrasive carbon foam of claim 20, wherein said high volatile bituminous coal has a Gieseler initial softening temperature above about 380° C.
22. (Amended) The method of forming an abrasive ~~semi-crystalline, largely isotropic,~~ carbon foam of claim 21, wherein said high volatile bituminous coal has a Gieseler initial softening temperature ranging from about ~~between about~~ 380° C ~~and to~~ about 400° C.
23. (Amended) The method of forming abrasive ~~semi-crystalline, largely isotropic,~~ carbon foam of claim 20, wherein said high volatile bituminous coal has a plastic range of at least about 50° C.
24. (Amended) The method of forming an abrasive carbon foam of claim 20, wherein said high volatile bituminous coal has a plastic range ranging from ~~of from about~~ 75° C to about 100° C.
25. (Amended) The method of forming an abrasive carbon foam of claim 20, wherein said high volatile bituminous coal has a maximum fluidity of at least several hundred ddpm as determined by ASTM D2639.

26. (Amended) The method of forming an abrasive carbon foam of claim 25, wherein said high volatile bituminous coal has a maximum fluidity of more than 2000 ddpm as determined by ASTM D2639.
27. (Amended) The method of forming an abrasive carbon foam of claim 20, wherein said high volatile bituminous coal exhibits an expansion of at least about 20% as determined by Arnu dilatation.
28. (Amended) The method of forming an abrasive carbon foam of claim 27, wherein said high volatile bituminous coal exhibits an expansion of at least about 100% as determined by Arnu dilatation.
29. (Amended) The method of forming an abrasive carbon foam of claim 20, wherein said high volatile bituminous coal: ~~1) comprises;~~ A) from about 50 to about 60% by weight of fixed carbon; and ~~B) less than about 30% by weight inert maceral material;~~ 2) wherein the high volatile bituminous coal exhibits a vitrinite reflectance in the range of from about 0.80 ~~and to~~ to about 0.95 as determined by ASTM D2798 ~~and 3) exhibits 0.0 volume % moderate or severe oxidation as determined by ASTM D2798.~~

30. (Amended) The method of forming an abrasive carbon foam of claim 1, wherein the
abrasive carbon foam has ~~having~~ a density ranging from ~~of between~~ about 0.2
g/cm³ ~~and~~ to about 0.5 g/cm³.
31. (Amended) The method of forming an abrasive carbon foam of claim 1, wherein the
abrasive carbon foam has a density ~~of between~~ ranging from about 0.3 g/cm³ ~~and~~
to about 0.4 g/cm³.
32. (Amended) The method of forming an method of claim 8, wherein said carbide
precursor comprises a member selected from the group consisting of materials
capable of reacting with carbon to form carbides under at least one of ~~carbon~~
calcining and graphitizing ~~conditions~~.
33. (Amended) The method of forming an method of claim 32, wherein said carbide
precursor is selected from the ~~eroup~~ group consisting of: tungsten, silicon and
titanium.
34. (Amended) The method of forming an method of claim 32, wherein said carbon
precursor powder ~~is of a~~ has particle size sizes below about 100 µm ~~microns~~.
35. (Amended) The method of forming an method of claim 31, wherein said particulate
coal exhibits a free swell index ranging from ~~of between~~ about 3.75 ~~and~~ to about
4.5.

36. (New) An abrasive carbon foam, comprising:
- a semi-crystalline porous coal-based structure having a density ranging from about 0.2 to about 0.5 g/cm³, wherein the density is varied by an introduction of an inert non-oxidizing gas into a reaction vessel; and
- wherein the semi-crystalline porous coal-based structure includes a metallic carbide for improving abrasive character of the abrasive carbon foam.
37. (New) The abrasive carbon foam of claim 36, wherein the metallic carbide includes tungsten carbide.
38. (New) The abrasive carbon foam of claim 36, wherein the metallic carbide includes silicon carbide.
39. (New) The abrasive carbon foam of claim 36, wherein the metallic carbide includes titanium carbide.
40. (New) The abrasive carbon foam of claim 36, wherein the density ranging from about 0.3 to about 0.4 g/cm³.
41. (New) The abrasive carbon foam of claim 36, wherein the abrasive carbon foam has pore sizes of below about 300 μ m.